

# FRED Module

Fast Recovery Epitaxial Diode

$$V_{RRM} = 600 \text{ V}$$

$$I_{FAVM} = 304 \text{ A}$$

$$t_{rr} = 250 \text{ ns}$$

## Part number

MEA 300-06DA

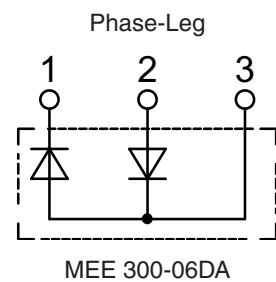
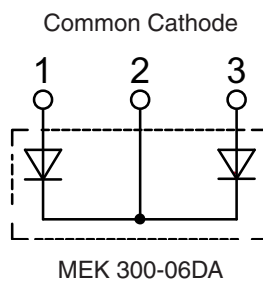
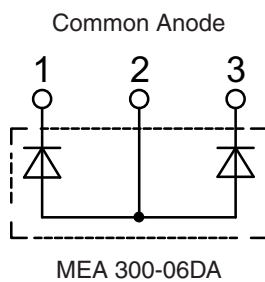
MEK 300-06DA

MEE 300-06DA



 E72873

Backside: isolated



## Features / Advantages:

- International standard package with DCB ceramic base plate
- Planar passivated chips
- Short recovery time
- Low switching losses
- Soft recovery behaviour
- High reliability circuit operation
- Low voltage peaks for reduced protection circuits
- Low noise switching
- Low losses

## Applications:

- Antiparallel diode for high frequency switching devices
- Free wheeling diode in converters and motor control circuits
- Inductive heating and melting
- Uninterruptible power supplies (UPS)
- Ultrasonic cleaners and welders

## Package: Y4-M6

- Isolation voltage: 3600 V~
- Industry standard outline
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

## Disclaimer Notice

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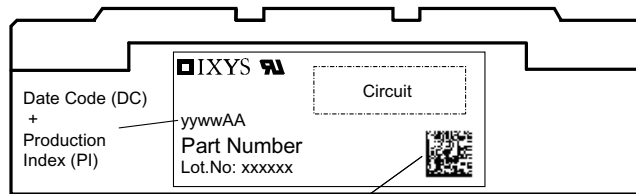


| Diode         |                                         |                                                             |                                | Ratings |       |       |                   |
|---------------|-----------------------------------------|-------------------------------------------------------------|--------------------------------|---------|-------|-------|-------------------|
| Symbol        | Definitions                             | Conditions                                                  |                                | min.    | typ.  | max.  |                   |
| $V_{RSM}$     | max. non-repetitive reverse             |                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 600   | V                 |
| $V_{RRM}$     | max. repetitive reverse                 |                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 600   | V                 |
| $I_R$         | reverse current                         | $V_R = V_{RRM}$                                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 12    | mA                |
|               |                                         | $V_R = 0.8 \cdot V_{RRM}$                                   | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 3     | mA                |
|               |                                         | $V_R = 0.8 \cdot V_{RRM}$                                   | $T_{VJ} = 125^{\circ}\text{C}$ |         |       | 80    | mA                |
| $V_F$         | forward voltage                         | $I_F = 300 \text{ A}$                                       | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 1.27  | V                 |
|               |                                         |                                                             | $T_{VJ} = 125^{\circ}\text{C}$ |         |       | 1.05  | V                 |
|               |                                         | $I_F = 520 \text{ A}$                                       | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 1.36  | V                 |
|               |                                         |                                                             | $T_{VJ} = 125^{\circ}\text{C}$ |         |       | 1.19  | V                 |
| $I_{FRMS}$    | RMS forward current                     |                                                             | $T_C = 75^{\circ}\text{C}$     |         |       | 430   | A                 |
| $I_{FAV}^{①}$ | average forward current                 | $T_C = 75^{\circ}\text{C}$<br>rectangular, $d = 0.5$        | $T_{VJ} = 150^{\circ}\text{C}$ |         |       | 304   | A                 |
| $V_{TO}$      | threshold voltage                       | for power-loss calculations only                            | $T_{VJ} = T_{VJM}$             |         |       | 0.85  | V                 |
| $r_T$         | slope resistance                        |                                                             |                                |         |       | 1.34  | m $\Omega$        |
| $R_{thJC}$    | thermal resistance junction to case     |                                                             |                                |         | 0.085 | 0.143 | K/W               |
| $R_{thCH}$    | thermal resistance junction to heatsink |                                                             |                                |         |       |       | K/W               |
| $P_{tot}$     | total power dissipation                 |                                                             | $T_{VJ} = 25^{\circ}\text{C}$  |         |       | 875   | W                 |
| $I_{FSM}$     | max. surge forward current              | $t = 10 \text{ ms}$ (50 Hz), sine                           | $T_{VJ} = 45^{\circ}\text{C}$  |         |       | 2.40  | kA                |
|               |                                         | $t = 8.3 \text{ ms}$ (60 Hz), sine                          |                                |         |       | 2.64  | kA                |
|               |                                         | $t = 10 \text{ ms}$ (50 Hz), sine                           | $T_{VJ} = 150^{\circ}\text{C}$ |         |       | 2.16  | kA                |
|               |                                         | $t = 8.3 \text{ ms}$ (60 Hz), sine                          |                                |         |       | 2.38  | kA                |
| $I^2t$        | $I^2t$ value for fusing                 | $t = 10 \text{ ms}$ (50 Hz), sine                           | $T_{VJ} = 45^{\circ}\text{C}$  |         |       | 28.8  | kA <sup>2</sup> s |
|               |                                         | $t = 8.3 \text{ ms}$ (60 Hz), sine                          |                                |         |       | 29.3  | kA <sup>2</sup> s |
|               |                                         | $t = 10 \text{ ms}$ (50 Hz), sine                           | $T_{VJ} = 150^{\circ}\text{C}$ |         |       | 23.3  | kA <sup>2</sup> s |
|               |                                         | $t = 8.3 \text{ ms}$ (60 Hz), sine                          |                                |         |       | 23.8  | kA <sup>2</sup> s |
| $t_{rr}$      | max. reverse recovery current           | $I_F = 300 \text{ A}; -di_F/dt = 400 \text{ A}/\mu\text{s}$ | $T_{VJ} = 25^{\circ}\text{C}$  |         | 140   | 170   | ns                |
|               |                                         |                                                             | $T_{VJ} = 100^{\circ}\text{C}$ |         | 250   | 300   | ns                |
| $I_{RM}$      | reverse recovery time                   | $V_R = 300 \text{ V}; L \leq 0.05 \mu\text{H}$              | $T_{VJ} = 25^{\circ}\text{C}$  |         | 35    | 45    | A                 |
|               |                                         |                                                             | $T_{VJ} = 100^{\circ}\text{C}$ |         | 55    | 70    | A                 |

①  $I_{FAVM}$  rating includes reverse blocking losses at  $T_{VJM}$ ,  $V_R = 0.8 V_{RRM}$ , duty cycle  $d = 0.5$

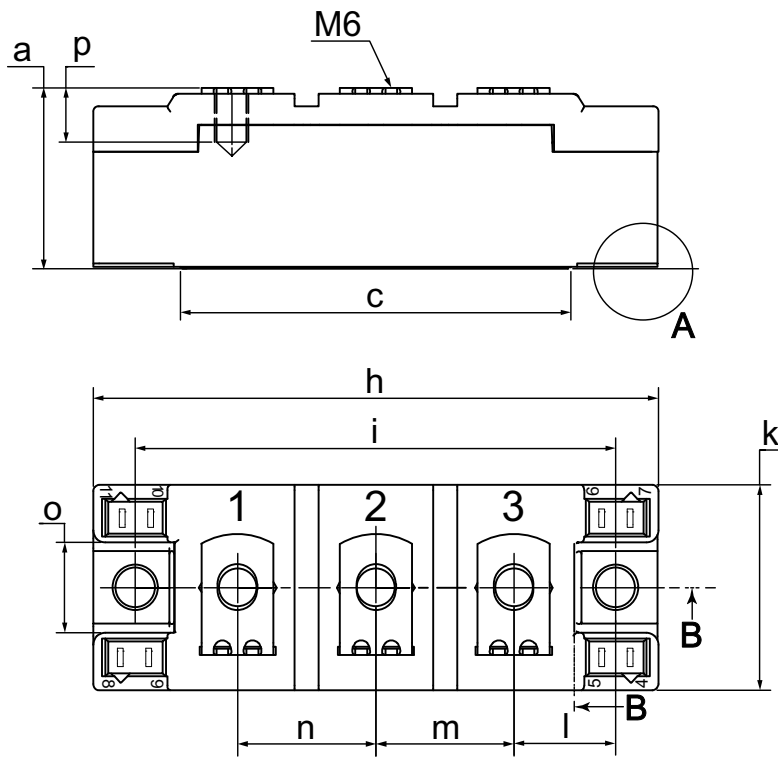


| Package Y4-M6 |                                                              |                                  |                                     | Ratings      |      |         |
|---------------|--------------------------------------------------------------|----------------------------------|-------------------------------------|--------------|------|---------|
| Symbol        | Definitions                                                  | Conditions                       |                                     | min.         | typ. | max.    |
| $I_{RMS}$     | RMS current                                                  | per terminal                     |                                     |              |      | 300 A   |
| $T_{VJ}$      | virtual junction temperature                                 |                                  |                                     | -40          |      | 150 °C  |
| $T_{op}$      | operation temperature                                        |                                  |                                     | -40          |      | 125 °C  |
| $T_{stg}$     | storage temperature                                          |                                  |                                     | -40          |      | 125 °C  |
| Weight        |                                                              |                                  |                                     |              | 126  | g       |
| $M_D$         | mounting torque                                              |                                  |                                     | 2.25         |      | 2.75 Nm |
| $M_T$         | terminal torque                                              |                                  |                                     | 4.5          |      | 5.5 Nm  |
| $d_{Spp/App}$ | creepage distance on surface   striking distance through air | terminal to terminal             | 14.0                                | 10.0         |      | mm      |
| $d_{Spb/Apb}$ |                                                              |                                  | 16.0                                | 16.0         |      | mm      |
| $V_{ISOL}$    | isolation voltage                                            | $t = 1$ second<br>$t = 1$ minute | 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA | 3600<br>3000 |      | V<br>V  |

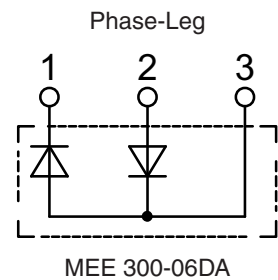
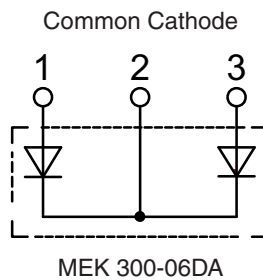
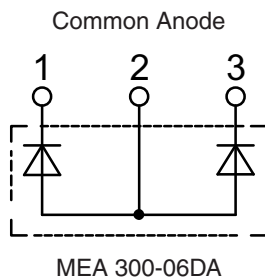
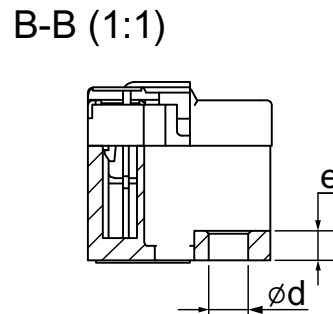
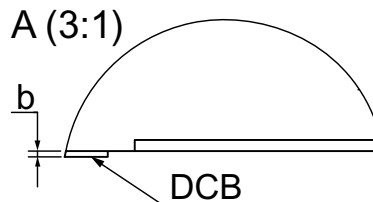


Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

| Ordering | Part Name    | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|----------|--------------|--------------------|-----------------|----------|---------------|
| Standard | MEA 300-06DA | MEA 300-06DA       | Box             | 36       | 464686        |
| Standard | MEK 300-06DA | MEK 300-06DA       | Box             | 36       | 464619        |
| Standard | MEE 300-06DA | MEE 300-06DA       | Box             | 36       | 464708        |

**Outlines Y4-M6**


| Dim. | min<br>[mm] | max<br>[mm] | min<br>[inch] | max<br>[inch] |
|------|-------------|-------------|---------------|---------------|
| a    | 30.0        | 30.6        | 1.181         | 1.205         |
| b    | typ. 0.25   |             | typ. 0.010    |               |
| c    | 64.0        | 65.0        | 2.520         | 2.559         |
| d    | 6.5         | 7.0         | 0.256         | 0.275         |
| e    | 4.9         | 5.1         | 0.193         | 0.201         |
| h    | 93.5        | 94.5        | 3.681         | 3.720         |
| i    | 79.5        | 80.5        | 3.130         | 3.169         |
| k    | 33.4        | 34.0        | 1.315         | 1.339         |
| l    | 16.7        | 17.3        | 0.657         | 0.681         |
| m    | 22.7        | 23.3        | 0.894         | 0.917         |
| n    | 22.7        | 23.3        | 0.894         | 0.917         |
| o    | 14.0        | 15.0        | 0.551         | 0.591         |
| p    | typ. 10.5   |             | typ. 0.413    |               |



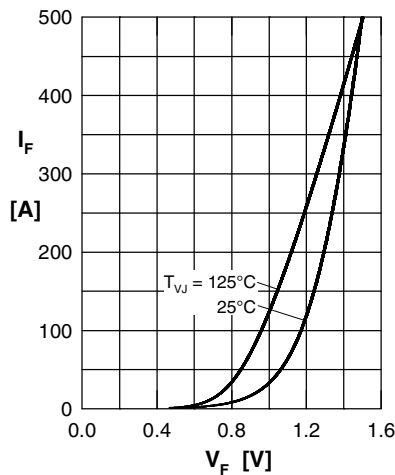
**Curves**


Fig. 1 Typ. forward current  $I_F$  versus max. voltage drop  $V_F$  per leg

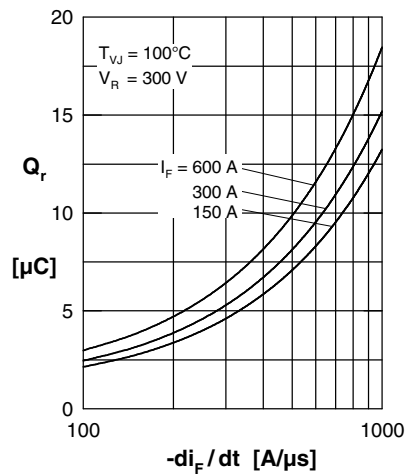


Fig. 2 Typ. reverse recovery charge  $Q_r$  versus  $-di_F/dt$

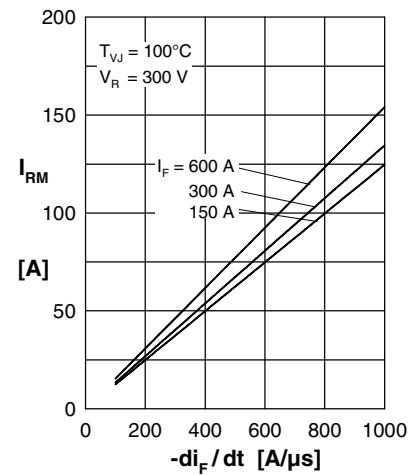


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

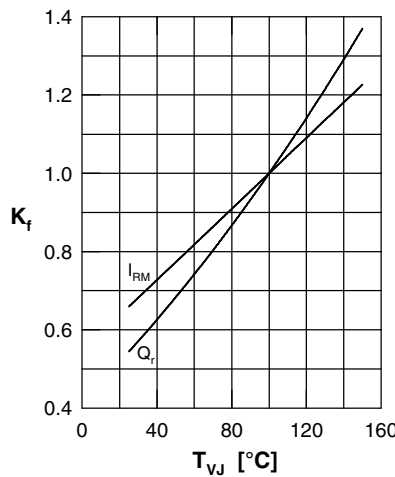


Fig. 4 Typ. dynamic parameters  $Q_r$ ,  $I_{RM}$  versus junction temperature  $T_{VJ}$

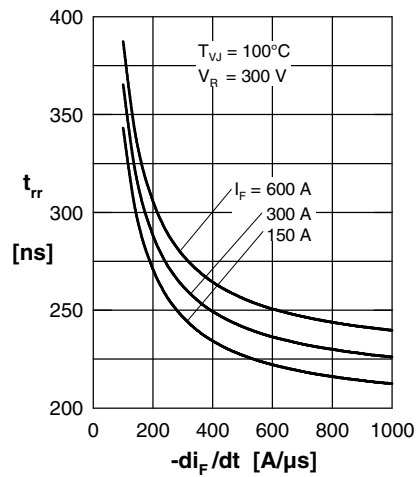


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

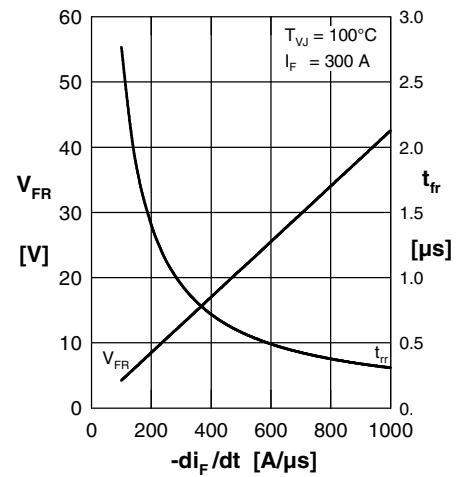


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{rr}$  versus  $-di_F/dt$

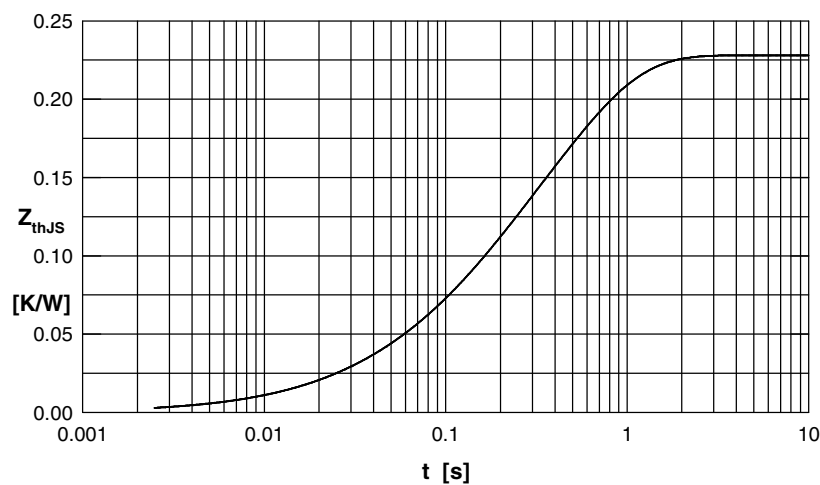


Fig. 7 Typ. transient thermal impedance junction to heatsink

Constants for  $Z_{thJS}$  calculation:

| i | $R_{thi}$ [K/W] | $t_i$ [s] |
|---|-----------------|-----------|
| 1 | 0.002           | 0.080     |
| 2 | 0.008           | 0.024     |
| 3 | 0.054           | 0.112     |
| 4 | 0.164           | 0.464     |